

Heat and Changes in Matter

3-4 The student will demonstrate an understanding of the changes in matter that are caused by heat.

3-4.4 Identify sources of heat and exemplify ways that heat can be produced (including rubbing, burning, and using electricity).

Taxonomy level: 1.1-A Remember Factual and
2.2-B Understand Conceptual Knowledge

Previous/Future knowledge: The concept of heat or how it can be produced is new material for this grade level. Students will further develop the concept of sources of heat energy in 6th grade (6-5.1).

It is essential for students to know that sources of heat produce heat energy and make things warmer, for example, fires, stoves, toasters, ovens, the Sun, light bulbs, engines, animals, and other common objects in their environment. They should also identify the following ways that heat can be produced:

Rubbing

- When objects are *rubbed* together, heat is produced.
- For example, when hands *are rubbed* together, they get warmer on a cold day.

Burning

- When materials are *burned* in a fire, heat can be produced.
- For example, when wood or candles are burned, they produce heat.

Using electricity

- When *electricity* is used, heat can be produced.
- For example, when electricity is used in light bulbs, heaters, stoves, toasters, or ovens, things get warmer.

It is not essential for students to know ways to extinguish fires or what materials are necessary for fires to start, or for students to know that particles of matter move faster as a result of heat production.

Assessment Guidelines:

One objective of this indicator is to *identify* sources of heat; therefore, the primary focus of assessment should be to recognize an object or material that produces and gives off heat.

Another objective is to *exemplify* ways heat can be produced, therefore, the primary focus of that objective is to give examples of producing heat by rubbing, burning, or using electricity. However, appropriate assessments should also require students to *illustrate* heat being produced by the processes of rubbing, burning, and using electricity.